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CONSUMER ACCEPTANCE OF INNOVATED POTATO-BASED COOKIES IN UGANDA

ACCEPTATION PAR LES CONSOMMATEURS DE BISCUITS INNOVANTS À BASE DE POMME DE TERRE EN OUGANDA

B. NANTAMBI, J. MUGISHA[1], J. BONABANA-WABBI and L. NASIRUMBI SANYA[2]

Department of Agribusiness and Natural Resource Economics, Makerere University, P. O. Box 7062, Kampala, Uganda
[1]Kabale University, P. O. Box 317, Kabale, Uganda
[2]Department of Extension and Innovation Studies, Makerere University, P. O. Box 7062, Kampala, Uganda
Corresponding author: nantambi98@gmail.com

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ABSTRACT

Use of innovations in the African agricultural sector has been at an increase, with African countries emphasising the need to invest in and grow small businesses to take advantage of their own resources and exploit them as a basis for participating in the global value chains. The increasing urbanisation, which is transforming consumer eating habits calls for innovations in the food sector to satisfy the increased demand for convenient snacks, including cookies, bread and other baked products. The objective of this study was to assess consumer acceptance of innovated potato-based cookies and the factors that influence their purchase frequency. The study was conducted in South-western Uganda where potato-based cookies were processed. A sample of 613 adult potential consumers was selected from three big urban centres in the region. A binary Logit model was used to analyse the consumer survey data. Results showed high (over 80%) consumer acceptability for the new product. Consumer's age, income, *per capita* quantity and availability of related snacks were the key factors influencing the frequency of cookie purchases. It is apparent that the use of locally grown potato as a substitute for wheat provides favourable competitiveness at processor and market levels. The study results present an opportunity to strengthen local agricultural value chains and reduce dependence on imported food products, which is in line with Uganda's strategy on agro-industrialisation.

Key Words: Agro-industrialisation, import substitution, innovation, potato, purchase frequency

RÉSUMÉ

L'utilisation des innovations dans le secteur agricole africain est en hausse, les pays africains insistant sur la nécessité d'investir dans les petites entreprises et de les développer afin de tirer parti de leurs propres ressources et de les exploiter comme base de participation aux chaînes de valeur mondiales. L'urbanisation croissante, qui transforme les habitudes alimentaires des consommateurs, appelle des innovations dans le secteur alimentaire pour satisfaire la demande accrue de collations pratiques, notamment les biscuits, le pain et d'autres produits de boulangerie. L'objectif de cette étude était d'évaluer l'acceptation par les consommateurs de biscuits innovants à base de pomme de terre et les facteurs qui influencent leur fréquence d'achat. L'étude a été menée dans le sud-ouest de l'Ouganda, où les biscuits à base de pomme de terre ont été transformés. Un échantillon de 613 consommateurs adultes potentiels a été sélectionné dans trois grands centres urbains de la région. Un modèle Logit binaire a été utilisé pour analyser les données de l'enquête auprès des consommateurs. Les résultats ont montré une acceptabilité élevée (plus de 80 %) du nouveau produit par les consommateurs. L'âge du consommateur, son revenu, la quantité par habitant et la disponibilité de collations similaires étaient les principaux facteurs influençant la fréquence d'achat de ces biscuits. Il apparaît clairement que l'utilisation de pommes de terre cultivées localement comme substitut au blé offre une compétitivité favorable au niveau des transformateurs et du marché. Les résultats de l'étude offrent une opportunité de renforcer les chaînes de valeur agricoles locales et de réduire la dépendance vis-à-vis des produits alimentaires importés, ce qui s'inscrit dans la stratégie de l'Ouganda en matière d'agro-industrialisation.

Mots Clés: Agro-industrialisation, substitution des importations, innovation, pomme de terre, fréquence d'achat

INTRODUCTION

Potato is one of the popular raw materials for the different fast foods consumed in urban areas in sub-Saharan Africa and elsewhere. Potato-based cookies is a more recent innovation of fast foods, with potential for substituting for the currently popular wheat-based cookies, the raw materials of which are almost entirely imported. The second edition of the African Innovation Summit that took place in 2018 in Rwanda emphasised the need to invest in and grow small businesses in Africa as a key to building more competitive economies; and to take advantage of their own resources and exploit them as a basis for participating in the global value chains (Adesida *et al.*, 2021).

In the global and regional food sectors, innovation has been accelerated by the increasing population and urbanisation, which are transforming consumer eating habits with increased demand for convenient snacks. With this, the bakery sector is gaining more popularity (Królak *et al.*, 2022) with increasing demand for cookies, bread, cakes and other baked products.

In Uganda, local supplies of cookies, largely made of wheat flour as the main ingredient, are supplemented by imports from India with a share of 77% (US$6.73 million), Kenya with 9.45% (US$822,000), United Arab Emirates (2.7%) and South Africa with 2.52% (Chatellier, 2021).

In line with the national agro-industrialisation agenda which promotes use of locally produced goods and import substitution, a brand of potato-based cookies was innovatively produced. The locally grown potato (*Solanum tuberosum* L.) forms a large proportion of the ingredients. The potato makes a perfect substitution for imported wheat which has been used to make cookies dominating in domestic and regional markets. Production of the potato-based cookies was found technically feasible with positive results from sensory testing. However, the question remained whether these cookies were accepted by consumers, given the variety of wheat-based cookies which have been in the market

for years with established market positions, and the unknown change in consumer behaviour. The long-term purchase frequency of the innovated potato-based snacks in the emerging urban markets also remains unexplored.

The success of the innovation in the potato-based cookies, therefore, largely depends on how consumers perceive and accept them as substitutes for the already existing wheat-based cookies and other similar wheat products; for example, biscuits, mandazi, daddies and bread. They only differ in the ingredients used and nutrition composition. The innovated cookies are largely processed from locally available potato without wheat; they are therefore gluten-free. The objective of this study was to assess consumer acceptance of the newly developed potato-based cookies and to analyse the key factors that influence their purchase frequency.

METHODOLOGY

The study area. A survey was conducted in urban centres of South-western Uganda, where the potato-based cookies were produced. The area was purposively selected because consumers in the region had higher proximity access to the product, especially in the initial stages of introducing it to the market. The region is the major producer of potato in the country, and the crop is a staple food for the local rural and urban households. The crop has a developed market structure linking farmers to consumers in different urban markets, but with limited processing and value addition. Processing potato tubers into baked snacks was a wide divergency from the traditional form in which consumers prepared and consumed it; from boiled tubers or fried chips consumed as a meal to processed cookies consumed as a snack with a different market structure.

Sample selection. A representative sample of potential adult consumers was selected from the largest three urban areas (Kabale, Kisoro and Mbarara) in South-western Uganda. The number of respondents selected was determined using Cochran's (1963) sample size formula as in Equation 1.

$$n = \frac{(Z - \text{score})^2 * SD * (1 - SD)}{SE^2} \quad \ldots\ldots\ldots (1)$$

Where:

n stands for the calculated sample size, SD is the standard deviation and SE is the standard error.

A high confidence level of 99% was assumed with a corresponding z-score of 2.576, and a standard deviation of 0.5 and standard error of estimate of ±5%. This gave a total sample of 664 respondents, which was distributed among the three urban areas to about 221 respondents from each. Given that there was no compiled list of the residents or consumers in these urban areas, the convenience sampling method was used to select the consumers to interview. This was done by walking along the different streets in different random directions, using a non-systematic random selection of adults in their residences; and shop and street business attendants including parked boda boda (motor cycle) riders. The target was 221 respondents from each urban area, but there were drop-outs mid-way the interviews; reducing the useable sample to 613 (191 respondents in Kabale, 198 in Kisoro and 224 in Mbarara), which nonetheless was sufficiently representative.

Data collection. A consumer survey was conducted among the selected urban respondents. Face to face interviews were done using a pre-tested questionnaire to collect primary data on socio-economic characteristics of the respondents, confectionary purchase behaviour, and consumer perceptions on the attributes of samples of the newly developed potato-based cookies. They were asked the most important attributes they usually considered when buying cookies. They were also asked how often they

would buy the potato-based cookies if they were in the market shelves.

Cheap Talk (CT) was used to mitigate hypothetical bias where respondents were first informed about the product composition (Aprile *et al.*, 2012). Samples of potato-based cookies, picked directly from the processor, were presented to the sampled respondents (potential consumers). This was followed by signing consent form before tasting the cookies. They were uniform in sweetness and crunchiness. However, they varied in colour, shape and size of the containers in which they were packed. They were in two different colours (dark brown and light brown), two different shapes (round and star shaped), and in two different pack sizes (relatively big of about 300 g and small of about 100 g). The samples in their different appearances (by colour, shape and pack size) were presented to each selected respondent to make observation on extrinsic attributes and report their impression. The respondents were found wherever they were (in a field setting) to avoid any environment bias. Upon their consent, they were asked to taste the cookies and report their impression. In between sample tasting and evaluations, they were given mineral water to rinse their mouth to minimise carryover effects before tasting the next sample.

Data processing and analysis. Data were processed and analysed using STATA Version 14. At post-data collection, the selected respondents (potential consumers of the potato-based cookies) were segmented on the basis of whether they were buying or not buying the cookies already available on the market. Those buying (referred to as "buyers") formed the buyer segment and constituted 61%; those not buying (referred to as "non-buyers") formed the non-buyer segment accounting for 39% of the sample. Segmentation was also made based on the frequency at which the respondents were buying the market-available cookies. This formed three segments; "frequent consumers" segment (55.5% of the sample), comprised consumers who were buying cookies on a weekly basis; "occasional consumers" segment (37.5%), comprised consumers who were buying cookies on a monthly basis; and "rare consumers" segment (7.0%), comprised consumers who were buying cookies at most twice in a year.

Consumer acceptance for the new potato-based cookies was assessed based on the degree to which the potential consumers liked or disliked the attributes of the cookies on a 5-point Likert-scale (1 = strongly dislike, 2 = dislike, 3 = neither like nor dislike, 4 = like, 5 = strongly like). The analysis considered the responses on both intrinsic and extrinsic attributes of the cookies. The intrinsic attributes were those specific to the cookies, including taste and mouthfeel. The extrinsic attributes included price, piece size, colour and shape of the cookies, pack size, expiry date, and brand name.

To determine the factors that were likely to influence the buying frequency of the cookies, a binary logit model was used. Theoretically, a multinomial logit regression could have been used. However, the responses on 'how frequent' were so skewed to 'weekly' and widely spread for 'monthly and yearly'. This made the multinomial logit model unrealistic with attempted estimation yielding unreasonable results. From a business perspective, consumers purchasing cookies at least once a week are more likely to contribute consistently to category sales volume, exhibit stronger brand familiarity and respond differently to marketing and product attributes compared with the less frequent consumers. Besides, weekly purchase frequency is the common consumer behaviour for such snack products as cookies. They are typically purchased and replenished on a weekly shopping cycle in many retail contexts. As such, the analysis focused on a respondent being "frequent" or "not frequent".

Among the interviewed consumers, weekly was the mostly reported purchase frequency for both the cookies they were already buying and how often they would buy the potato-based

cookies. Subsequently, consumers who reported a frequency of at least once a week were considered "frequent consumers" and assigned a value of 1, and the rest were considered "non-frequent consumers" and assigned a value of 0. Specifically, a logistic regression (Equation 2) as used by Ndenga *et al*. (2017) was adopted.

$$y_i = \beta x_i + \varepsilon_i \quad \text{..... (2)}$$

Where:

y_i is a dependent binary variable, x_i is the vector of explanatory variables, β is the estimated coefficients and ε_i is the disturbance term of the regression. The logit model was expressed as:

$$L_i = \text{In}\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_i X_i \quad \text{..... (3)}$$

Where:

L_1 is the log of odds ratio called logit, P_i is the probability in favour of frequent buying, $1 - P_i$ is the probability of non-frequent buying, $\left(\frac{P_i}{1-P_i}\right)$ is the ratio of average probability for frequent consumers to non-frequent consumers (Costa e Silva *et al*., 2020), X_i represents a vector of independent variables, β_i are coefficients which represents the marginal effect in the log of odds and β_0 is a constant representing the value of log of odds when all other predictors have a value of zero.

The log of odds was converted into marginal probability before interpretation (Norton, 2012), after estimating the model as in Equation 4.

$$C_F = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_1 \quad \text{..... (4)}$$

Where:

C_F is binary (frequent or non-frequent) in buying cookies.

Description of variables used in the logit model. The variables used in the binary logit model included gender and age bracket of potential consumer, income, the quantity of cookies they were already purchasing, and their employment status (Table 1).

RESULTS AND DISCUSSION

Characteristics of urban consumers of cookies. The majority the respondents interviewed (61%) were buyers of cookies, of whom (59.4%) were female (Table 2). However, the percentage was not significantly higher than that for the male buyers, implying that consumption of cookies in South-western Uganda was gender-neutral. The absence of gender disparity in cookie consumption demonstrates the existence of a socially inclusive and potentially stable market for potato-based cookies. This creates an opportunity for product commercialisation and scaling because the processors can target a wide general population rather than a specific demographic group.

The majority of the buyers were the youth (below 34 years old) constituting 79.6%. This was attributed to the lifestyle in consumption; the youth tend to prefer, cookies, biscuits and snacks to other food stuffs (Aljefree *et al*., 2022). Uganda has the world's youngest population with over 78% of its population below the age of 30 years (UBOS, 2020). This favours the consumption of cookies; however, the youth were also the majority among the non-buyers. These were mainly students and others who were unemployed, explained by lack of purchasing power. This implies that age is not the key driver for consumption of cookies. Therefore, the consumption market is wider since the youthful age represents a potentially large consumer base. Additionally, young consumers are highly responsive to trendy and convenience foods and snacks, which provides an economic incentive to the innovated potato-based cookies.

TABLE 1. Covariate variables used in the logit model

Variable	Description of the variable
X_1	Age of potential consumer of potato-based cookies (in years)
X_2	Gender of potential consumer of potato-based cookies; 1= female, 0= male
X_3	[2]Income earned per month by the potential consumer of potato-based cookies
X_4	Average quantity (packs) of cookies potential consumers were already purchasing
X_5	Whether consumers bought other related products in case cookies were not available (1= yes, 0= no)
X_6	[3]Employment status (self-employed, employed-salary, employed-wage, student)

[1]Age was categorised into three; (1) youth, comprising consumers aged below 34 years, consistent with the definition provided by the United Nations Children's Fund (UNICEF) (2) middle-aged consumers, comprising those aged 34-54 years and (3) elderly consumers comprising those aged 55 and above.

[2]Consumer income was categorised in accordance with the Uganda Revenue Authority (URA) individual income taxation thresholds. The categories were aligned with the URA tax bands whereby individuals earning more than US$63.58 but not exceeding US$90.64 are subject to 10% tax rate, while individuals earning above US$90.64 but not exceeding US$110.93 are charged US$2.71 plus an additional 20% tax on the excess income. Accordingly, the income grouping used in this study closely reflected the URA income taxation structure.

[3]Employement status was grouped into three categories; (1) self-employed consumers defined as individuals who managed or employed others within their own businesses, (2) employed salary-earners defined as consumers receiving a fixed monthly salary such as teachers, accountants, restaurant managers and veterinary doctors, and (3) employed wage-earners defined as consumers paid wage for casual or unskilled labour including boda boda riders, hair dressers, welders and carpenters.

Moreover, the innovation is not a major change from the existing cookies, implying easiness to penetrate the market. Studies indicate that usually innovations with small changes have a more prominent chance of being accepted than radical innovations (Shafi *et al.*, 2021). The cookies can therefore be strategically positioned in the market as a trendy locally made snack. This creates an opportunity for promoting the national potato value chain and contributing to the Buy Uganda Build Uganda national policy that promotes the consumption of locally produced goods and reduction of the country's trade deficit.

Majority (43.6%) of the buyers were self-employed; for example, as market vendors (10%), shop attendants (4%), boda-boda (motor cyclists) and taxi drivers (3%). Workers in such category of employment tended to work for long hours, had no break time for meals and others could not afford buying a meal. As such, picking a snack (e.g. cookies) was what they normally did. This provides insight into the acceptability of cookies as convenient and practical food products. Therefore, the frequent consumption of cookies among self-employed consumers is an indication of functional acceptability where consumers repeatedly choose the product because it satisfies immediate needs such as convenience, portability and ease of consumption during working hours. This factor could be a vital determinant of acceptability of the new potato-based cookies; with effective demand falling within a lower range of consumer income. This is reflected by the

TABLE 2. Socio-economic characteristics of the buyers and non-buyers of cookies

Variable	Buyers (%)	Non-buyers (%)	P-value
Sex of consumer (1=female)	59.41	56.43	0.466
Marital status of consumer (1=single)	46.24	47.72	0.720
***Education level (years of schooling)**			
No formal education	1.88	2.49	<0.001
Primary education	12.37	24.48	<0.001
Secondary education	50.54	56.85	<0.001
Post-secondary education	35.21	16.18	<0.001
Consumer age (years)			
Youth (below 34 years)	79.57	75.10	0.194
Middle age (34-54 years)	18.28	19.92	0.613
Elderly (55 and above)	2.15	4.98	0.054
Consumer employment status			
Student	18.36	45.76	0.091
Self-employed workers	43.56	24.15	0.596
Employed-salary earners	29.04	16.95	0.188
Employed-wage earners	9.04	13.14	0.004
Main occupation of household head			
Student	2.75	1.27	0.223
Self-employed	48.63	19.40	0.016
Employed-salary earners	31.59	58.65	0.003
Employed-wage earners	17.03	20.68	0.459
Consumer monthly income			
<US$81.17	40.32	26.97	0.001
≥US$81.17	59.68	73.03	0.001

*Education level, Fisher's Exact Test = 0.000

results in Table 2 which show that a significantly ($P \leq 0.01$) higher number of the non-buyers earned a relatively higher income, and a study by Shafi *et al*. (2021) that higher income influenced consumer acceptability for new and innovative products.

Table 2 shows that both buyer and non-buyer segments were characterised by females as the majority, mainly those who were married with secondary school education, the youth and employed earning at least US$81 monthly. The difference in between the segments was that students and salary-employed were the majority in the non-buyer segment. The lack of pattern among the buyers and non-buyers in terms of level of education, age of consumer, employment status and income suggested that there were other factors that either singly or in combination influenced consumer acceptability of the innovated cookies. It suggests that the innovated cookies have similar market potential across the socio-economic classes of the population, and this saves processors the cost of product customisation for the different customer segments.

Analysis of consumer responses after tasting the potato-based cookie samples

revealed a high level of acceptance. Approximately 80% of the participants expressed acceptability (Table 3), underscoring the product's strong potential for successful market introduction. The high level of acceptance arose from consumers' perception of the product attributes in relation to their utility satisfaction expectation. Package shape was the most liked attribute (by 91.6%), followed by pack size (90.5%) and taste of the cookies (86%). Consumers perceived the packaging shape as attractive and the pack size as convenient and portable. In the context of cookies, where intrinsic quality attributes cannot be fully evaluated prior to consumption, packaging serves as a critical extrinsic cue that influences consumer perceptions of product quality, safety and brand positioning.

A comparison of what consumers reported as the most liked attributes in the potato-based cookies with what they typically considered when purchasing cookies on the market revealed a slight mismatch. The largest percentage of the consumers (77.2%) considered taste as the most important attribute (Table 4), yet taste was scored third among the attributes they liked in the innovated cookies. Compromised product taste implies reduced chances of product acceptability as noted by Wang *et al*. (2022) that consumers use taste to decide what to eat. It is also similar to the study by Simons and Iii (2018) who evaluated sensory product characteristics to determine consumer acceptability of gluten-free cookies containing raw and germinated pinto bean flours. Their results indicated that beany and grassy flavours in raw edible bean flours reduced consumer acceptability of the cookies.

The other attributes of cookies that influenced consumers' acceptability, in a ranked order, were price of the cookies (by 43.3%), mouthfeel (30.1%), size of the piece (28.5%), colour of the cookies (20.4%), shape of the cookies (16.4%) and size of the pack (15.3%). This implies that a blend of economic, intrinsic and extrinsic product attributes drives consumer acceptability. Caracciolo *et al.* (2020) made a similar observation that both sensory and visual attributes affected consumer acceptability of 12 microgreen species, with overall consumer acceptance mainly determined by sensory attributes (flavour and texture).

Disaggregating by the different consumer segments, results in Table 5 further indicate that taste was the most important attribute that influenced consumers' acceptability of cookies in all the segments, and an attribute they considered first when deciding to buy. This is

TABLE 3. Consumer acceptability scores for the innovated potato-based cookies

Cookie attribute	Percentage of potential consumers					
	Strongly dislike	Dislike	Overall dislike	Like	Strongly like	Overall like
Package shape	0	8.37	8.37	59.93	31.69	91.62
Pack size	0.66	8.87	9.53	59.44	31.03	90.47
Taste	0.83	13.2	14.03	54.62	31.35	85.97
Shape	0.82	16.34	17.16	58.82	24.02	82.84
Appearance	2.3	23.28	25.58	56.89	17.54	74.43
Colour	1.96	23.69	25.65	56.37	17.97	74.34
Piece size	2.39	25.43	27.82	50.74	21.44	72.18
Mouthfeel	0.83	27.72	28.55	51.32	20.13	71.45
Overall average	1.2	18.4	19.6	56.0	24.4	80.4

TABLE 4. Product attributes driving consumer acceptability of cookies

Cookie attributes	Consumers responses (n=372)*	
	Number	Percent
Sensory attributes		
Taste	287	77.15
Mouthfeel	112	30.11
Economic attributes		
Price	161	43.28
Physical attributes		
Piece size	106	28.49
Colour of cookie	76	20.43
Shape of cookie	61	16.40
Pack size	57	15.32
Expiry date	52	13.98
Brand name	50	8.06
Cookie appearance	48	12.90

*N of 372 is the sub-sample of the respondents who were "the buyers" of cookies

similar to results by Wahyudi *et al*. (2019) that aroma and taste were key attributes that induced greater satiation and consumers' purchases of locally produced foods.

The price of the cookies was considered second across the consumer segments. High (low) price of cookies price negatively (positively) influences consumers' acceptance and preference to other substitutes. Several studies have shown pricing as an important factor in food purchases and consumption (Waterlander *et al.*, 2010; DiSantis *et al.*, 2013). It is believed that pricing has a significant effect on consumer buying behaviour (Zhao *et al.,* 2021); the higher the product is priced, the lower the acceptance of the product. This can lead to purchases of related products whose market prices are lower. This is similar to findings by Hasa *et al.* (2019) that consumers perceive price rationality differently, where their price perception is driven from other competing products. This suggests adopting market-penetration pricing strategies for the newly developed potato-based cookies, such as, localised penetration pricing (Nothemba and Floyd, 2026), low introductory pricing (Alnes *et al.*, 2025), discounts and promotions (Wang *et al.*, 2020), or loss-leader pricing (Dong *et al.*, 2020).

The other important attributes are mouthfeel, piece size and cookie shape, but the order of importance varied across the segments (Table 5). For example, the frequent consumers considered mouthfeel more important than the colour of the cookies, but this was the reverse for the rare consumers. Luo *et al.* (2019) observed that colour preference might influence consumers' overall subjective perception about a product which, in turn, affects the decision to accept the food product. The colour affects consumers' product expectation or perceived product quality. Sometimes colour comes as a result of ingredients used in making a product and it is highly correlated with the nutrients in a product. Elderly consumers are more concerned with the perceived health obtained from consumption of a given food product (Olsen *et al.*, 2012), and therefore the colour attribute is also important for this consumer segment. However, a study by Olsen *et al*. (2012) indicated that colour effects depend on several factors including gender and age of the consumer.

Categorising the potential consumers by age, results in Table 6 similarly show that taste attribute was the most important across the different age brackets. The order of other attributes (price of the cookies, mouthfeel, piece size, etc.) is also similar as in the other consumer segments.

These results, therefore, depict that among the potential consumers of potato-based cookies, taste of the cookies is the most important attribute that can lead to acceptance or rejection of the cookies. This is followed by the price at which the cookies are sold, the

TABLE 5. Product attributes driving consumers' acceptability of cookies, disaggregated by purchase frequency

Cookie attribute	Frequent consumers		Occasional consumers		Rare consumers	
	(n=206)	percent	(n=140)	percent	(n=26)	percent
Taste	163	78.74	106	75.71	16	61.54
Product price	96	46.38	50	35.71	14	53.85
Mouthfeel	69	33.33	37	26.43	5	19.23
Piece size	65	31.40	33	23.57	7	26.92
Shape	36	17.39	24	17.14	1	3.85
Colour	35	16.91	33	23.57	7	26.92
Pack size	29	14.01	23	16.43	5	19.23
Expiry date	29	14.01	21	15.00	2	7.69
Appearance	27	13.04	18	12.86	3	11.54
Brand name	23	11.11	25	17.86	2	7.69

TABLE 6. Product attributes driving consumer acceptability of cookies, disaggregated by age

Cookie attribute	Young consumers		Middle-aged consumers		Elderly consumers	
	(n=296)	percent	(n=68)	percent	(n=8)	percent
Taste	228	47.80	53	45.69	6	30.00
Product price	126	26.42	29	25.00	6	30.00
Mouthfeel	85	17.82	25	21.55	2	10.00
Piece size	82	17.19	21	18.10	3	15.00
Shape	56	11.74	17	14.66	3	15.00
Colour	50	10.48	10	8.62	1	5.00
Pack size	46	9.64	10	8.62	1	5.00
Expiry date	43	9.01	9	7.76	0	0.00
Appearance	41	8.60	9	7.76	0	0.00
Brand name	40	8.39	8	6.90	0	0.00

mouthfeel, the size of the cookie piece, the colour and shape of the cookies. Pack size, expiry date, brand name and appearance of the cookies are also considered but not as important. The implication is that the processor should put particular emphasis on optimising the taste attribute to enhance and sustain consumer acceptability of the potato-based cookies. It also suggests using a tested market-penetration pricing strategy, as well as considering customer preferences for product colour and shape to accelerate market entry.

Factors influencing the frequency of purchasing potato-based cookies. The frequency of food purchase, cookies inclusive, is one of the consumer behaviours that vary from one consumer to another. The frequency depends on a number of factors including consumer characteristics, social, economic and cultural factors. Table 7 shows that the three segments of consumers of cookies (frequent, occasional and rare) constituted an almost balanced gender mix of males and females, and the married and singles.

The youth, those with secondary school education, and those earning at least US$81.17 monthly dominated each of the segments.

Results from the logit model estimation (Table 8) show that four variables; age and income of a consumer, per capita quantity and availability of related snacks, had a significant influence on the frequency of consumer purchases of cookies. The average log likelihood statistic of -248.93 ($P \leq 0.01$) suggests that the model fits the data and the independent variables jointly influence the consumers' purchase frequency.

The results in Table 8 indicate that the younger the consumer, the higher their likelihood to purchase cookies frequently. Generally, the youth are more attracted to sweet confectionary products as compared to those in the upper age bracket who tend to be more health conscious of such foods. As consumers age, they gradually change their eating habits from buying ready made, factory processed snacks to home-prepared food. Relatedly, the young generation tends to be interested in trying out new popularised and trendy foods, contrary to the aged who tend to be too rigid to change their traditional eating habits. This is supported by Wahyudi *et al.* (2019) who found that increase in age had a significant influence on consumers' frequency of purchasing locally-produced rice.

As our study hypothesised, consumers' income had a positive significant ($P \leq 0.05$) influence on the frequency of cookie

TABLE 7. Socio-economic characteristics of potential consumers of potato-based cookies, by "frequency" segments

Consumer characteristic	Frequent consumer (n=206)	Occasional consumers (n=140)	Rare consumers (n=26)	P-value
Sex of consumer (1=female)	36.71	46.43	42.31	0.193
Marital status (1=single)	46.38	46.43	42.31	0.922
Age of consumer				
Below 34 years	77.78	82.14	80.77	0.605
34-54 years	19.81	15.71	19.23	0.620
55 and above	2.42	2.14	0	0.725
Employment status				
Self-employed	47.03	40.58	34.62	0.312
Employed-salary	27.23	30.43	34.62	0.656
Employed-wage	8.42	10.87	3.85	0.469
Student	17.33	18.12	26.92	0.491
Education level				
No formal education	2.42	0.71	3.85	0.392
Primary school education	14.01	10.71	7.69	0.392
Secondary education	49.28	50.71	61.54	0.392
Post-secondary education	34.30	37.86	26.92	0.392
Availability of substitutes	18.36	23.57	26.92	0.371
Monthly income				
<US$81.17	38.65	44.29	34.62	0.472
≥US$81.17	61.35	55.71	65.38	0.472

TABLE 8. Factors that influence a consumer's frequency of purchasing cookies

Frequency of buying (1=Frequent; 0=Non-frequent)	Coefficient	Standard error	Marginal effects	P-value
Middle age (34-54 years)	-0.777	0.292	0.090	0.008
Elderly (55 and above)	-0.617	0.619	-0.023	0.319
Consumer is female	-0.019	0.236	-0.003	0.936
Log income of a consumer	0.242	0.122	0.035	0.048
Per capita quantity	-0.371	0.087	-0.054	<0.001
Presence of related snacks	3.179	0.248	0.461	<0.001
Self-employed	-0.134	0.443	-0.020	0.759
Employed-salary earner	-0.254	0.466	-0.037	0.585
Employed-wage earner	-0.835	0.516	-0.121	0.106
Constant	-3.983	1.467	0.981	0.007

Number of observations = 542 LRchi2(9) = 251.11 Prob.chi2 = 0.00001
Log likelihood = -248.93367 Pseudo R2= 0.3353

purchases. When income increases, the likelihood that they purchase cookies more frequently increases. Income is a primary determinant of consumer purchasing behaviour. Because consumers aim to maximise satisfaction subject to a budget constraint, both the quantity of products they purchase and the frequency of purchase are directly influenced by their income level (Daba *et al.*, 2021). An increase in consumer income relaxes the budget constraint, enabling consumers to allocate more resources to consumption, which in turn increases their purchase frequency. This finding is similar to that by Wahyudi *et al*. (2019) who found that consumers' annual income had a positive and significant effect on the frequency of purchasing locally produced rice in Indonesia. In this study, however, an income paradox was observed where a significantly ($P \leq 0.01$) higher number of non-buyers of cookies earned a relatively higher income (Table 2). This is because, consistent with Engel's Law, preference and demand for cookies tend to rise with increasing income; shifting from a luxury good at low income levels to a perceived necessity at higher income levels. However, beyond a certain income threshold, the demand may decline as consumers either begin to regard them as an inferior good or shift their preferences toward alternative products.

The availability of related snacks in the consumer's immediate vicinity is another key determinant of cookie purchase frequency. Results in Table 8 show a positive and significant effect ($P \leq 0.01$) on the likelihood of frequent cookie purchases when related snacks were available within the consumer's proximity. This finding is consistent with substitution behaviour, whereby consumers switch to related snacks to avoid the monotony or consumption fatigue associated with repeatedly consuming the same product. The results highlight a strategic opportunity for introducing the newly developed potato based cookies into a market that already accommodates related snacks, thereby increasing the likelihood of consumer acceptance. The presence of these related snacks creates a receptive environment for product introduction, as consumers are already familiar with similar products.

Per capita quantity had a negative and significant ($P \leq 0.01$) influence on the frequency of cookie purchases. This implies that when the number of household members who consume cookies decreases (resulting in a higher per capita quantity), the likelihood of frequent cookie purchases correspondingly

declines. This means that for a given (fixed) quantity of cookies consumed by the household, a reduction in the number of household members who eat cookies increases the time taken before the next purchase is made, thereby reducing the purchase frequency. Conversely, when the number of household members who consume cookies increases (resulting in a lower per capita quantity), the likelihood of the consumer to frequently purchase the cookies increases.

CONCLUSION AND RECOMMENDATIONS

The study assessed consumer acceptance of the newly developed potato-based cookies and the factors that influence their purchase frequency. The main finding of the study was that the cookies had high consumer acceptance, indicating that substituting wheat with locally grown potato in processing does not significantly alter consumer behaviour. It implies that the potato-based cookies can compete effectively with imported wheat brands in both processing and the marketplace.

The innovation therefore represents a practical import substitution option for the bakery industry and aligns closely with Uganda National Development Plan's agro industrialisation agenda, which priorities domestic production and value addition. Scaling up the processing and commercialisation of the innovated cookies therefore presents an opportunity to strengthen local agricultural value chains, enhance market linkages among producers, processors and consumers, and reduce dependence on imported food products.

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